
UTAH DEPARTMENT OF TRANSPORTATION

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Structural Steel Painting

Today's high performance coating systems demand close scrutiny during every phase of the coating operation. From the mixing and thinning of the products, to the measurement of ambient, to the testing of the substrate for cleanliness and roughness, to proper application, compliance with the specification and the best use of time, product, and manpower are critical. Over-inspection can impede progress, while inadequate inspection can cause costly rework, even premature coating failure. Understanding what to inspect, when to inspect, and how to inspect is a crucial part of every coatings operation.



PROPER APPLICATION

Surface Preparation for Painting - Often, the surface preparation of steel for painting requires a three step process: 1) Initial pre-cleaning to remove grease, oil, and dirt; 2) Cleaning with hand/power tools, pressurized water, chemicals, or abrasive blasting; 3) Creation or verification of the proper anchor pattern profile. The life of a coating depends as much on the degree of surface preparation as on the selected coating system. Most coating failures can be attributed to inadequate surface preparation or lack of coating adhesion. Surface preparation, therefore, should receive thorough consideration. The primary functions of surface preparation are, to remove surface contaminants that can induce premature coating failure and to provide a clean surface with adequate profile for good coating adhesion.

Factors Affecting Coating Application

1. Temperature: The application of a coating system should occur only when the air and substrate temperature is within the range indicated by the manufacturer's written instructions for both application and curing and can be expected to remain in that range. Special coating materials are available that would allow for application below 60 °F.
 2. Moisture: Coatings should not be applied in rain, wind, snow, fog, or mist, or when the steel surface temperature is less than 5 °F (3 °C) above the dew point. Coatings should not be applied to wet or damp surfaces unless the coating is formulated and certified by the manufacturer for this type of application. Coatings should not be applied on frosted or ice-coated surfaces.
 3. Humidity: Because curing of coatings may be adversely affected by humidity that is too low or too high, no coating should be applied unless the manufacturer's written requirements for humidity are met. Some coatings (e.g., some inorganic zinc and polyurethane coatings) cure by chemically reacting with water, and so require a minimum humidity for complete curing. High humidity may cause moisture to condense on or react with uncured coating films to cause blushing or other adverse effects.
 4. Cover: When coating must be applied in damp or cold weather, the steel must be coated when the surrounding air and the steel are heated to a satisfactory temperature. In all such cases, the temperature and moisture conditions still must be met. Where cover is required to achieve these conditions, the steel should remain under cover or be protected until dry or weather conditions permit its exposure.
 5. Continuity: To the maximum extent practical, each coat shall be applied as a visually continuous film of
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uniform thickness free of pores. All thin spots or areas missed in the application shall be recoated and permitted to dry before the next coat of coating is applied.

6. Thickness: Dry film thickness determinations shall be performed as specified. In the event the required minimum thickness is not achieved as specified, additional coats shall be applied in accordance with the manufacturer's instructions until the required thickness is obtained. The inorganic zinc-rich coatings shall not be corrected in this manner unless the manufacturer's instructions specifically permit this practice.

7. Recoating: Each coating layer shall be in a proper state of cure or dryness before the application of the succeeding coat so that it is not adversely affected by the top coating. Consult the coating manufacturer for the appropriate time interval before recoating.

8. Intercoat Adhesion: When applying multiple coats of two component thermosetting systems, topcoats shall be applied within the recoat window specified by the manufacturer of the undercoat in order to obtain good intercoat adhesion. If, for any reason, this time period is exceeded, the undercoat surface shall be specially treated as recommended by its manufacturer before top coating. Such treatments include mild abrasion, solvent treatment, and use of a fog coat.

9. Contact Surfaces: Surfaces to be in contact only after field erection shall receive the full-specified coating system before assembly. Steel surfaces not in direct bonded contact, but inaccessible after assembly, shall receive the full-specified coating system before assembly. Contact surfaces of members to be joined by high strength bonds in a friction connection are a special case. Unless specifically authorized to the contrary, they shall be left uncoated and free of oil, grease, and coatings. However, faying surfaces of friction connection may be coated with approved coatings, which do not release the coefficient of friction between contact surfaces, in accordance with the American Institute of Steel Construction (AISC) and the Research Council on Structural Connections (RCSC).

10. Induction Time and Pot Life: The induction time (sometimes called "sweat-in time") and pot life requirements of the manufacturer shall be met.

INSPECTION/QUALITY CONTROL

Proper inspection of structural steel painting requires specialized equipment and training, especially when the removal of lead based paint is involved. Please contact those listed below for assistance.

SPECIFICATIONS/DETAILS

<http://www.udot.utah.gov/esd/2002Standards/Specs/PDFFiles/UDOT2002Specs.pdf>

Section 09972 "Painting for Structural Steel"

Section 09991 "Cleaning and Repainting Structural Steel"

Section 09992 "Cleaning and Overcoating Structural Steel"

FURTHER INFORMATION

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<http://www.sspc.org> Structural Steel Painting Council
